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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/520,972	07/19/2005	Herbert Naarmann	45866-0001US1	6453

23973 7590 07/02/2008

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EXAMINER	
SUITTE, BRYANT P	

ART UNIT	PAPER NUMBER
1795	

MAIL DATE	DELIVERY MODE
07/02/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/520,972	NAARMANN ET AL.	
	Examiner	Art Unit	
	BRYANT SUITTE	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *28-73* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *28-73* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

METHOD FOR THE PRODUCTION OF DEVICES FOR STORING ELECTRIC POWER BASED ON RECHARGEABLE LITHIUM POLYMER CELLS

Examiner: Suitte 10/520,972 Art Unit: 1795 June 10, 2008

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 28-33, 36-44, 47-50, 52-57, 61-65, 66 and 67 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chern et al. (US 5,749,927) in view of Park et al. (US 6,692,873).

Regarding claims 28, 31, 32 and 33, Chern disclose a process to produce a lithium polymer batteries comprising an anode electrode (anode mass) comprising lithium that can intercalate with graphite, coke and the like (carbon) and the cathode electrode comprising lithiated manganese oxide (lithium intercalatable heavy metal oxide). See column 3 line 23-35 and column 4 lines 15-26. The anode and cathode are formulated by combining a solid polymer electrolyte of a polymer binder, a liquid (solvent), and a salt (supporting electrolyte). See column 3 lines 36-67 and column 5 lines 19-25. The anode and/or cathode composites are fed into an extruder (8) and formed through a die (10) to provide an electrode sheet (12). The electrode sheet is extruded onto a current collector (14) in the form of a conductive metal foil, screen, grid or the like, to form an electrode. The electrode can be coated with a layer of a solid

polymer electrolyte, made of a blend of a binder, a liquid, an additive and a salt, as set forth above with respect to the solid polymer electrolyte. A battery (20) can then be assembled by layering two of the electrodes so formed having opposite polarities. See column 4 lines 28-37. It is the position of the examiner that the lamination process is operated at ambient temperature (room temperature). However, Chem does not disclose degassing the anode and cathode electrodes.

Park discloses the formation of a lithium secondary battery comprising a resultant structure is placed into an argon gas atmosphere (degassing) at 40^0C in a vacuum state and 1 X 10^{-2} torr. See column 9 lines 25-35. Therefore, it would have been obvious to one of ordinary skill in the art to utilize the argon gas atmosphere under a vacuum state with the formulation process of Chern because Park teaches that the argon gas atmosphere completes the assembly of the lithium secondary battery by removing excess gas from the lithium secondary battery.

Regarding claims 29 and 30, Chern discloses that the formulation of the electrodes occur from 120 to 150 centigrade. See column 5 lines 50-60.
Regarding claim 35, Chern discloses that the anode electrode comprises graphite, coke and the like. See column 3 lines 32-35.

Regarding claim 36, Chern discloses that the anode electrode comprises graphite. Graphite consists of many grapheme sheets stacked together. See column 3 lines 32-35.

Regarding claims 37 and 38, Chern discloses that the anode electrode comprises graphite. See column 3 lines 32-35. Fullerenes are a family of carbon

allotropes, molecules composed entirely of carbon, in the form of a hollow sphere, tube, or plane.

Regarding claim 39, Chern disclose that the anode electrode comprises coke from 50 to 85% by weight of the anode. See example 3.

Regarding claim 40, Chern discloses that the cathodes, suitable solid particulate materials are, metal chalcogenides (oxide) having a metal selected from Ti, Zr, Hf, Nb, Cu, Fe, Ta, V, Mn, Cr, Co, Ni and mixtures of these metals alone or together with intercalated metals, such as lithium or sodium. See column 3 lines 25-32 and column 4 lines 18-22.

Regarding claim 41, Chern discloses a cathode comprising a lithiated and over-lithiated manganese oxide (distorted lattice structure). See column 4 lines 18-22.

Regarding claim 42, Chern disclose a cathode comprising manganese oxide from 50% to 85% by weight of the cathode electrode. See example 1.

Regarding claim 43, Chern discloses that the electrolyte can be $LiPF_6$. See column 3 lines 64-67.

Regarding claim 44, Chern discloses that the electrolyte $LiPF_6$ is 0.1 to 15% weight of the anode or cathode. See example 1, 2 and 3.

Regarding claim 47, Chern discloses that the electrode mixtures comprise an additive to improve processing and the characteristics of the final product. It is the position of the examiner that the Li salt impregnates the additive in the formulation process of the lithium battery. See column 5 lines 19-25.

Regarding claim 48, Chern discloses that the additive, Hypermer KD-1, is 1.2 weight percent of the electrolyte. See example 1 and 3.

Regarding claim 49, Chern discloses an organic liquid capable of solvating the polymer electrolyte components of a polymer binder and a salt (electrolyte additive). See column 3 lines 36-42.

Regarding claim 50, Chern disclose a solvent that can be diethyl carbonate, ethylene carbonate and others stated. See column 3 lines 53-60.

Regarding claim 52, Chern discloses that the solvent comprise 1 to 1000% by weight of the supporting electrolyte. See examples 1, 2, and 3.

Regarding claim 53, Chern discloses that polyvinylpyrrolidone and polyvinyl difluoride are binders utilized in the composition of electrode. See column 3 lines 44-50.

Regarding claim 54, Chern disclose that the polymer binder is 5 to 30% by weight of the anode or cathode. See examples 1, 2 and 3.

Regarding claims 55 and 62, Chern discloses the current collector (separator) has the form of a conductive metal foil, screen or grid. See column 4 lines 28-32.

Regarding claim 56, Chern disclose the current collector is coated with polymer electrolyte, a binder, a liquid (solvent), and a salt (additive). See column 4 lines 30-35.

Regarding claims 57, 61 and 65, Chern discloses the process of forming a anode or cathode electrode comprising the mixing of the liquid (solvent), electrolyte, and a salt (additive) coupled with the lithium intercalatable metal oxide cathode and the lithium intercalatable carbon anode. The current collector is then layered with the opposite

polarity electrode thereby formulating a battery. See column 3 lines 18-67 and column 4 lines 1-45 and figure 1.

Regarding claim 63, Chern disclose that the formulation of the electrodes comprise the electrode mixtures fed through an extruder (8) and formed through a die (8) (doctor blade application) and then coated onto a current collector. See column 4 lines 28-35.

Regarding claim 64, Chern discloses that the cathode is formulated on a current collector in the form of aluminum foil. See column 4 lines 38-42.

Regarding claim 67, Chern discloses intermixing of the cathode composition and the solid polymer separator when the two similarly-composed extrusion layers were brought into contact while still warm. Accordingly, the surfaces of the two layers blended together to form a laminate that was ready for assembly into cells (housing and poling). The anode and cathode films can be used in a plate-type or jelly-roll battery (housing and poling storage device). See column 6 lines 16-40.

3. Claim 34 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chern et al. (US 5,749,927) and Park et al. (US 6,692,873) as applied to claims 28-33, 36-44, 47-50, 52-57, 61-65, 66 and 67 above, and further in view of Arai et al. (US 2002/0160273).

Regarding claim 34, Chern and Park disclose a process to produce lithium polymer batteries as recited in paragraph 2. However, Chern and Park do not disclose the presence of perfluoroalkyl ether.

Arai discloses a lithium secondary battery comprising a fluorinated solvent such as perfluoroalkyl ether. See claim 7. Therefore, it would have been obvious to one of ordinary skill in the art to utilize the fluorinated solvent with the lithium polymer battery of Chern and Park because Arai teaches that a solvent with a low dielectric constant provides high temperature storage characteristics. See abstract.

4. Claims 45 and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chern et al. (US 5,749,927) and Park et al. (US 6,692,873) as applied to claims 28-33, 36-44, 47-50, 52-57, 61-65, 66 and 67 above, and further in view of Kweon et al. (US 7,138,209).

Chern and Park disclose a process to produce lithium polymer batteries as recited in paragraph 2. However, Chern and Park do not disclose additives comprising Li metaborate, Li silicate, aluminum oxide and silicon dioxide.

Kweon discloses that Li_xMO_2, (M is at least one element selected from Co, Ni or Mn; x is 0.5 to 1), is coated with a lithiated intercalation compound. The coating material (additive) is selected from boron oxide, boric acid, lithium hydroxide, aluminum oxide, lithium aluminate, lithium metaborate, silicon dioxide, lithium silicate or mixtures thereof. See figure 1-4 and column 2 lines 9-18. Therefore, it would have been obvious to one of ordinary skill in the art to utilize the coating material with the battery of Chern and Park because Kweon teaches that coating the lithium metal oxide can improve electrochemical properties of the lithium polymer battery.

5. Claim 51 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chern et al. (US 5,749,927) and Park et al. (US 6,692,873) as applied to claims 28-33, 36-44, 47-50, 52-57, 61-65, 66 and 67 above, and further in view of Sato et al. (US 2002/0034685).

Regarding claim 51, Chern and Park disclose a process to produce lithium polymer batteries as recited in paragraph 2. However, Chern and Park do not disclose an organic solvent selected from the group of glycol ether, a substituted urea, a cyclic urea and fluoroalkyl methacrylic acid ester.

Sato discloses a lithium based battery comprising glycol ether, dimethyl carbonate and diethyl carbonate as a solvent. See paragraph 107. Therefore, it would have been obvious to one of ordinary skill in the art to utilize glycol ether as a solvent with the lithium battery of Chern and Park because Sato teaches that glycol ether can be a functional equivalent to dimethyl carbonate and diethyl carbonate.

Regarding claims 68-72, Chern and Park disclose a process to produce lithium polymer batteries as recited in paragraph . However, Chern and Park do not disclose a binder comprising polyethylene, polyvinyl ethers, butadiene copolymers, produced block polymers, butyl rubber, and fluoroelastomers.

Sato discloses a lithium based battery comprising binders such as polyethylene, hydrogenated butadiene rubber (butadiene copolymer), butyl rubber, fluorine based elastomer (fluoroelastomer), polyvinylidene fluoride, styrene-butadiene rubber (block polymers) used singly or in combination of two or more. See paragraphs 38, 43, 44 and 78. Therefore, it would have been obvious to one of ordinary skill in the art to

utilize the binders with the lithium polymer battery of Chern and Park because Sato teaches that the binders are functional equivalents.

6. Claims 58-60 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chern et al. (US 5,749,927) and Park et al. (US 6,692,873) as applied to claims 28-33, 36-44, 47-50, 52-57, 61-65, 66 and 67 above, and further in view of Kudo et al. (US 2002/0172869).

Regarding claims 58, 59 and 60, Chern and Park disclose a process to produce lithium polymer batteries as recited in paragraph . However, Chern and Park do not disclose that the mixing and grinding occurs in an ultrasonic bed at room temperature to 100^0C.

Kudo discloses that the colloidal structure of the metal element and the particulate conductive material are mixed and dispersed by ultrasonic dispersing (ultrasonic bed) at a temperature of 0 to 40^0C. Therefore, it would have been obvious to one of ordinary skill in the art to utilize the ultrasonic dispersing with the lithium battery of Chern and Park because Kudo teaches that the electrode material has decreased bulkiness than traditional methods. See paragraph 25.

7. Claim 73 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chern et al. (US 5,749,927) and Park et al. (US 6,692,873) as applied to claims 28-33, 36-44, 47-50, 52-57, 61-65, 66 and 67 above, and further in view of Koloski et al. (6,608,129).

Regarding claim 73, Chern and Park disclose a process to produce lithium polymer batteries as recited in paragraph . However, Chern and Park does not disclose the polymer binder polyalkylene oxide.

Koloski discloses the composites taught can be utilized in a solid polymer electrolyte in a non-aqueous lithium battery comprises a polymer matrix with polyalkylene. See claims 3 and 14. therefore, it would have been obvious to one of ordinary skill in the art to utilize polyalkylene as a polymer binder with the battery of Chern and Park because Koloski teaches that composites comprising the polymer matrices are controllable, predictable, and contain reproducible level of electrical, ionic and charged species conductivities which can be used in conducting electrodes. See column 6 lines 55-67 and column 7 line 1.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to BRYANT SUITTE whose telephone number is (571)270-3961. The examiner can normally be reached on Mon-Fri 10-6.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dah-Wei Yuan can be reached on 571-272-1295. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

BS

/Dah-Wei D. Yuan/
Supervisory Patent Examiner, Art Unit 1795